National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 6900 (DSI-6900)

HISTORICAL CLIMATOLOGICAL NETWORK - DAILY TEMPERATURE, PRECIPITATION & SNOWDEPTH, SUNSHINE & CLOUD DATA

April 28, 2003

National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

:

Table of Contents

Topic	Page Number
1. Abstract	3
2. Element Names and Definitions:	7
3. Start Date	22
4. Stop Date	22
5. Coverage	22
6. How to order data	23
7. Archiving Data Center.	23
8. Technical Contact	23
9. Known Uncorrected Problems	23
10. Quality Statement	23
11. Essential Companion Data Sets	26
12. References	26

1. Abstract: This document describes a database containing daily observations of maximum and minimum temperature, precipitation amount, snowfall amount, and snow depth from 1062 observing stations across the contiguous United States. This database is as expansion and update of the original 138-station database previously released by the Carbon Dioxide Information Analysis Center (CDIAC). These 1062 stations are a subset of the 1221-station U.S. Historical Climatology Network (HCN).

Data from 1050 of these daily records extend into the 1990's, while 990 of these extend through 1997. Most station records are essentially complete for at least 40 years; the latest beginning year of record is 1948. Records from 158 stations begin prior to 1900, with that of Charleston, South Carolina beginning the earliest (1871).

The stations were chosen using a number of criteria including length of period of record, percent missing data, number of station moves and other station changes that may affect the data homogeneity, and spatial coverage. Included with the data set are metadata files that contain station history information about station moves, instrumentation, observing times, and elevation.

This data set also includes United States monthly and annual historical time series of sunshine duration (observed hours of sunshine, maximum possible hours of sunshine, and percentage of possible sunshine) and mean sunrise to sunset and fractional cloud amount.

A total of 240 sunshine time series (longest period of record, 1891-1987) and 197 cloud amount time series (longest period of record, 1871-1987) have been assembled. These data sets contain the most complete and highest quality cloud and sunshine time series available to the research community and should prove invaluable in the assessment of climate change in the United States over the last century.

TABLE 1

STATION NAMES

03103	023010	AZ	FLAGSTAFF	12916	166660	LA	NEW ORLEANS
03812	310300	NC	ASHEVILLE	12917	417174	TX	PORT ARTHUR
03813	095443	GA	MACON	12918	414307	TX	HOUSTON
03870	383747	SC	GREENVILLE-SPARTANBURG	12921	417945	TX	SAN ANTONIO
03871	331581	OH	CINCINNATI	12924	412015	TX	CORPUS CHRISTI
03927	412242	TX	DALLAS-FORT WORTH	12930	166659	LA	NEW ORLEANS
03928	148830	KS	WICHITA	12938	41SATC	TX	SAN ANTONIO
03940	224472	MS	JACKSON	12940	412014	TX	CORPUS CHRISTI
03945	231791	MO	COLUMBIA	12943	417173	TX	PORT ARTHUR
03947	234358	MO	KANSAS CITY	12944	413430	TX	GALVESTON
04725	300687	NY	BINGHAMTON	12945	414305	TX	HOUSTON
12842	088788	FL	TAMPA	12960	414300	TX	HOUSTON
13723	313630	NC	GREENSBORO	13722	317069	NC	RALEIGH
13724	280325	NJ	ATLANTIC CITY	13739	366889	PA	PHILADELPHIA
13727	441362	VA	CAPE HENRY	13740	447201	VA	RICHMOND
13729	462718	WV	ELKINS	13743	448906	VA	WASHINGTON DC
13733	445120	VA	LYNCHBURG	13745	313897	NC	HATTERAS
13737	446139	VA	NORFOLK	13748	319457	NC	WILMINGTON
				13777	180470	MD	BALTIMORE

:

13778 446144 VA NORFOLK
13779 366909 PA PHILADELPHIA
13780 447206 VA RICHMOND
13782 381549 SC CHARLESTON
13784 317079 NC RALEIGH
13810 154951 KY LOUISVILLE
13865 225776 MS MERIDIAN
13867 466859 WV PARKERSBURG
13872 310301 NC ASHEVILLE
13874 090451 GA ATLANTA
13875 090495 GA AUGUSTA
13876 010831 AL BIRMINGHAM
13880 381544 SC CHARLESTON
13881 311690 NC CHARLOTTE
13882 401656 TN CHATTANOOGA
13883 381939 SC COLUMBIA
13886 383742 SC GREENVILLE
13891 404950 TN KNOXVILLE
13893 405954 TN MEMPHIS
13894 015478 AL MOBILE
13895 015550 AL MONTGOMERY
13897 406402 TN NASHVILLE
13899 086997 FL PENSACOLA
13956 224467 MS JACKSON
13957 168440 LA SHREVEPORT
13958 410428 TX AUSTIN
13960 412244 TX DALLAS
13961 413284 TX FORT WORTH
13962 410016 TX ABILENE
13963 034248 AR LITTLE ROCK
13964 032574 AR FORT SMITH
13967 346661 OK OKLAHOMA CITY
13968 348992 OK TULSA
13983 231790 MO COLUMBIA
13984 141767 KS CONCORDIA
13985 142164 KS DODGE CITY
13988 234359 MO KANSAS CITY
13994 237455 MO ST. LOUIS
13995 237976 MO SPRINGFIELD
13996 148167 KS TOPEKA
13998 148828 KS WICHITA
14608 172426 ME EASTPORT
14732 305811 NY NEW YORK CITY
14733 301012 NY BUFFALO
14735 300042 NY ALBANY
14738 300686 NY BINGHAMTON
14885 203337 MI GRAND RAPIDS
14887 474966 WI MADISON
14888 475484 WI MILWAUKEE
14889 338366 OH TOLEDO
14892 111572 IL CHICAGO
14893 362677 PA ERIE
14895 330058 OH AKRON-CANTON
14898 473269 WI GREEN BAY
14912 322158 ND DEVILS LAKE
14913 212248 MN DULUTH
14914 322859 ND FARGO
14739 190770 MA BOSTON
14740 063456 CT HARTFORD
14742 431081 VT BURLINGTON
14745 271683 NH CONCORD
14751 363699 PA HARRISBURG
14752 063451 CT HARTFORD
14755 275639 NH MOUNT WASHINGTON
14756 195159 MA NANTUCKET
14758 065273 CT NEW HAVEN
14759 306314 NY OSWEGO
14762 366992 PA PITTSBURGH
14764 176905 ME PORTLAND
14765 376698 RI PROVIDENCE
14767 367318 PA READING
14768 307167 NY ROCHESTER
14769 367902 PA SCRANTON
14771 308383 NY SYRACUSE
14773 288883 NJ TRENTON
14777 367905 PA WILKES-BARRE
14796 300047 NY ALBANY
14798 300691 NY BINGHAMTON
14799 37BIDC RI BLOCK ISLAND
14813 330063 OH AKRON
14814 200169 MI ALPENA
14820 331657 OH CLEVELAND
14821 331786 OH COLUMBUS
14822 202102 MI DETROIT
14824 202626 MI ESCANABA
14827 123037 IN FORT WAYNE
14830 203332 MI GRAND RAPIDS
14831 47GRBC WI GREEN BAY
14836 204641 MI LANSING
14837 474961 WI MADISON
14838 205178 MI MARQUETTE
14839 475479 WI MILWAUKEE
14842 116711 IL PEORIA
14846 337447 OH SANDUSKY
14847 207366 MI SAULT STE MARIE
14849 338356 OH TOLEDO
14860 362682 PA ERIE
14861 366997 PA PITTSBURGH
14874 11PIAC IL PEORIA
14881 111582 IL CHICAGO
14882 331662 OH CLEVELAND
14883 20DETC MI DETROIT
14884 202394 MI EAST LANSING
14920 474370 WI LA CROSSE
14922 215435 MN MINNEAPOLIS
14923 115751 IL MOLINE
14925 217004 MN ROCHESTER
14931 131063 IA BURLINGTON
14932 132069 IA DAVENPORT
14933 132203 IA DES MOINES
14934 132369 IA DUBUQUE
14935 253395 NE GRAND ISLAND
14936 394127 SD HURON
14939 254795 NE LINCOLN
:
:

14942 256255 NE OMAHA
14943 137708 IA SIOUX CITY
14959 212253 MN DULUTH
14960 474375 WI LA CROSSE
14961 21MSPC MN MINNEAPOLIS
14967 132208 IA DES MOINES
14968 39HONC SD HURON
14971 254815 NE LINCOLN
14983 25OMAV NE OMAHA
14987 13SIUC IA SIOUX CITY
22004 412357 TX DEL RIO
22010 412360 TX DEL RIO
23009 297610 NM ROSWELL
23041 410786 TX BIG SPRING
23042 415411 TX LUBBOCK
23043 297609 NM ROSWELL
23044 412797 TX EL PASO
23047 410211 TX AMARILLO
23050 290234 NM ALBUQUERQUE
23062 052220 CO DENVER
23066 053488 CO GRAND JUNCTION
23068 056738 CO PUEBLO
23073 29ABQC NM ALBUQUERQUE
23075 41AMAC TX AMARILLO
23080 41ELPC TX EL PASO
23154 262631 NV ELY
23160 028820 AZ TUCSON
23166 023007 AZ FLAGSTAFF
23169 264436 NV LAS VEGAS
23173 264434 NV LAS VEGAS
23174 045114 CA LOS ANGELES
23176 425654 UT MILFORD
23183 026481 AZ PHOENIX
23185 266779 NV RENO
23193 028815 AZ TUCSON
23225 040897 CA BLUE CANYON
23234 047769 CA SAN FRANCISCO
23272 047772 CA SAN FRANCISCO
24011 320819 ND BISMARCK
24014 32ISNC ND WILLISTON
24018 481675 WY CHEYENNE
26451 500280 AK ANCHORAGE
26617 506496 AK NOME
27274 356761 OR PORTLAND
93002 052225 CO DENVER
93016 14DDCC KS DODGE CITY
93022 05PUBC CO PUEBLO
93031 05GJTC CO GRAND JUNCTION
93058 056740 CO PUEBLO
93134 045115 CA LOS ANGELES
93140 026486 AZ PHOENIX
93193 043257 CA FRESNO
93708 44LYHC VA LYNCHBURG
93721 180465 MD BALTIMORE-
WASHINGTON DC
93725 448904 VA WASHINGTON DC
93729 311458 NC CAPE HATTERAS
24021 485390 WY LANDER
24023 256065 NE NORTH PLATTE
24026 396937 SD RAPID CITY
24029 488155 WY SHERIDAN
24032 25VINC NE VALENTINE
24032 258760 NE VALENTINE
24033 240807 MT BILLINGS
24035 243994 MT HAVRE
24037 245690 MT MILES CITY
24055 256070 NE NORTH PLATTE
24056 396947 SD RAPID CITY
24058 48SHRC WY SHERIDAN
24068 48CYSC WY CHEYENNE
24075 48LNDC WY LANDER
24127 427598 UT SALT LAKE CITY
24128 269171 NV WINNEMUCCA
24129 26WMCC NV WINNEMUCCA
24130 350412 OR BAKER
24131 101022 ID BOISE
24143 243751 MT GREAT FALLS
24144 244055 MT HELENA
24146 244558 MT KALISPELL
24149 105241 ID LEWISTON
24153 245745 MT MISSOULA
24156 107211 ID POCATELLO
24157 457938 WA SPOKANE
24175 427603 UT SALT LAKE CITY
24199 350417 OR BAKER
24213 042910 CA EUREKA
24225 355429 OR MEDFORD
24226 455932 WA NORTH HEAD
24229 356751 OR PORTLAND
24231 357326 OR ROSEBERG
24233 457473 WA SEATTLE-TACOMA
24239 458286 WA TACOMA
24240 458332 WA TATOOSH ISLAND
24281 457458 WA SEATTLE
25309 504100 AK JUNEAU
25324 504094 AK JUNEAU
26409 500285 AK ANCHORAGE
26411 502968 AK FAIRBANKS
93730 280311 NJ ATLANTIC CITY
93802 097847 GA SAVANNAH
93809 111166 IL CAIRO
93814 151855 KY CINCINNATI-NORTHERN
93815 332075 OH DAYTON
93817 122738 IN EVANSVILLE
93819 124259 IN INDIANAPOLIS
93820 154746 KY LEXINGTON
93821 154954 KY LOUISVILLE
93822 118179 IL SPRINGFIELD
93823 128725 IN TERRE HAUTE
93847 090456 GA ATLANTA
93848 090500 GA AUGUSTA
93849 311695 NC CHARLOTTE
93851 381944 SC COLUMBIA
93853 095447 GA MACON
:
:

93854 225772 MS MERIDIAN
93855 015483 AL MOBILE
93856 015555 AL MONTGOMERY
93858 406407 TN NASHVILLE
93859 087002 FL PENSACOLA
93860 09SAVC GA SAVANNAH
93869 010836 AL BIRMINGHAM
93890 331561 OH CINCINNATI
93891 331788 OH COLUMBUS
93892 124264 IN INDIANAPOLIS
93893 154956 KY LOUISVILLE
93896 118184 IL SPRINGFIELD
93914 416757 TX PALESTINE
93916 405964 TN MEMPHIS
93917 229220 MS VICKSBURG
93922 41ABIC TX ABILENE
93923 41AUSC TX AUSTIN
93928 41DALC TX DALLAS
93930 03LITC AR LITTLE ROCK
93936 16SHVC LA SHREVEPORT
93946 03FSMC AR FORT SMITH
93954 346656 OK OKLAHOMA CITY
93958 231795 MO COLUMBIA
93963 237460 MO ST. LOUIS
93964 148172 KS TOPEKA
93972 23MKCC MO KANSAS CITY
93981 23SGFC MO SPRINGFIELD
93982 14ICTC KS WICHITA
94012 243996 MT HAVRE
94014 329425 ND WILLISTON
94103 458931 WA WALLA WALLA
94104 244057 MT HELENA
94105 24MSOC MT MISSOULA
94154 105236 ID LEWISTON
94701 190775 MA BOSTON
94706 305816 NY NEW YORK CITY
94707 376703 RI PROVIDENCE
94712 43BTVC VT BURLINGTON
94718 363710 PA HARRISBURG
94734 17PWMC ME PORTLAND
94753 30BUFC NY BUFFALO
94756 27CONC NH CONCORD
94760 06BDLC CT WINDSOR LOCKS
94771 19TUKC MA NANTUCKET
94772 065266 CT NEW HAVEN
94777 30ROCC NY ROCHESTER
94781 30SYRC NY SYRACUSE
94793 370896 RI BLOCK ISLAND
94823 366993 PA PITTSBURGH
94830 338357 OH TOLEDO
94846 111549 IL CHICAGO
94847 202103 MI DETROIT
94849 200164 MI ALPENA
94850 205184 MI MARQUETTE
94860 203333 MI GRAND RAPIDS
94908 132367 IA DUBUQUE
94918 256260 NE OMAHA
99999 04FATC CA FRESNO
99999 08TPAC FL TAMPA
99999 10BOIC ID BOISE
99999 10PIHC ID POCATELLO
99999 123024 IN FORT WAYNE
99999 12EVVC IN EVANSVILLE
99999 12HUFC IN TERRE HAUTE
99999 141769 KS CONCORDIA
99999 15LEXC KY LEXINGTON
99999 20SSMC MI SAULT STE MARIE
99999 215589 MN MOORHEAD
99999 224462 MS JACKSON
99999 243749 MT GREAT FALLS
99999 244563 MT KALISPELL
99999 245685 MT MILES CITY
99999 26RNOC NV RENO
99999 29ROWC NM ROSWELL
99999 319462 NC WILMINGTON
99999 31GSOV NC GREENSBORO
99999 31RDUA NC RALEIGH-DURHAM
99999 320814 ND BISMARCK
99999 338598 OH DAYTON
99999 33DAYC OH DAYTON
99999 35MFRC OR MEDFORD
99999 38GSPC SC GREER
99999 40CHAC TN CHATTANOOGA
99999 40TYSC TN KNOXVILLE
99999 413283 TX FORT WORTH
99999 413285 TX FORT WORTH
99999 457488 WA SEATTLE
99999 45SKAC WA SPOKANE
99999 46EKNC WV ELKINS
99999 50ANCC AK ANCHORAGE
99999 50FAIC AK FAIRBANKS
99999 50OMEV AK NOME
:
:

TABLE 2

STATE CODES

01 AL Alabama	17 ME Maine	33 OH Ohio
02 AZ Arizona	18 MD Maryland	34 OK Oklahoma
03 AR Arkansas	19 MA Massachusetts	35 OR Oregon
04 CA California	20 MI Michigan	36 PA Pennsylvania
05 CO Colorado	21 MN Minnesota	37 RI Rhode Island
06 CT Connecticut	22 MS Mississippi	38 SC South Carolina
07 DE Delaware	23 MO Missouri	39 SD South Dakota
08 FL Florida	24 MT Montana	40 TN Tennessee
09 GA Georgia	25 NE Nebraska	41 TX Texas
10 ID Idaho	26 NV Nevada	42 UT Utah
11 IL Illinois	27 NH New Hampshire	43 VT Vermont
12 IN Indiana	28 NJ New Jersey	44 VA Virginia
13 IA Iowa	29 NM New Mexico	45 WA Washington
14 KS Kansas	30 NY New York	46 WV West Virginia
15 KY Kentucky	31 NC North Carolina	47 WI Wisconsin
16 LA Louisiana	32 ND North Dakota	48 WY Wyoming
		50 AK Alaska

2. Element Names and Definitions:

Station Inventory for the HCN/D Data Set

The station inventory file for the HCN/D data set is sorted by two-digit state code and four-digit Cooperative Network Index, with one record per station containing state code, Cooperative Network Index, state abbreviation, station name, beginning month and year of data, time of observation, latitude, and longitude.

Stated in tabular form, the contents of the **station inventory file** include the following.

Variable	Variable type	Variable width	Starting column	Ending column
State code	Character	2	2	3
CNI	Character	4	6	9
State	Character	2	12	13
Station Name	Character	23	16	38
Month	Character	2	41	42
Year	Numeric	4	45	48
Time	Character	5	51	55
Latitude	Numeric	2	58	59
Latitude Minute	Numeric	2	62	63
Longitude	Numeric	2	66	68
Longitude Minute	Numeric	2	71	72

where

:

State code is the two-digit state code (01-48), defined as character to allow for preserving leading zeros upon output;

CNI is the four digit Cooperative Network Index, defined as character above to allow for preserving leading zeros upon output;

State is the two-letter state abbreviation;

Station name is the station name;

Month is the beginning month of the daily maximum/minimum temperature record for a station;

Year is the beginning year of the daily maximum/minimum temperature record for a station. Precipitation data may begin in a different year;

Time is the predominant time at which temperature readings are historically taken at the site: morning (AM), evening (PM), or midnight (MD). Combinations of these codes indicate sites at which the excursion from a constant **Time** exceeded the 4-year limit imposed by the selection criteria;

Latitude is the degrees (north) portion of the station's latitude;

Latitude Minute is the minute's portion of the stations latitude;

Longitude is the degrees (west) portion of the station's longitude;

Longitude Minute is the minute's portion of the stations latitude.

Station History for the HCN/D Data Set

The station history file provides valuable information concerning each station in the HNC/D. This file documents station moves and instrument changes, lists station observers and observation times, and identifies suspect fields.

Stated in tabular form, the contents of the **station history file** include the following.

Variable	Variable type	Variable width	Starting column	Ending column
X	Alphanumeric	1	45	45
Station ID	Numeric	6	1	6
State	Character	2	8	9
Division	Numeric	2	11	12
Station Name	Alphanumeric	30	14	43
County	Alphanumeric	16	45	60
Cross Reference	Alphanumeric	25	62	86
Station ID 2	Numeric	6	1	6
Month	Numeric	2	8	9
Day	Numeric	2	11	12
Year	Numeric	4	14	17

Month end	Numeric	2	19	20
Day end	Numeric	2	22	23
Year end	Numeric	4	25	28

The next 15 numeric variables represent suspect fields in the station history file. The values for these variables will be either 0 or 1. Values of 1 represent fields flagged as suspect by the pre-key key editor.

Latitude	1	30	30
Longitude	1	31	31
Previous location	1	32	32
Elevation	1	33	33
Post office location	1	34	34
Station name	1	35	35
Qualifier	1	36	36
Instruments	1	37	37
Observation time	1	38	38
Instrument heights	1	39	39
Publications	1	40	40
Beginning date	1	41	41
Ending date	1	42	42
Observer	1	43	43
Other observers	1	44	44

Latitude	Alphanumeric	6	46	51
Longitude	Alphanumeric	7	53	59
Distance	Numeric	3	61	63
Direction	Alphanumeric	3	65	67
Elevation	Numeric	5	69	73
Distance from Post office	Numeric	3	75	77
Direction from Post office	Alphanumeric	3	79	81
Name	Character	28	83	110
Qualifier	Alphanumeric	10	112	121

The next 22 numeric variables represent the following instruments and classifications. If an instrument was used at a particular station or if a particular classification is appropriate for that station, the variable will have a value of 1; if it was not used the variable will have a value of 0.

Additional instrument	1	123	123
Cotton region shelter	1	124	124
Dry bulb thermometer	1	125	125
Class “A” evaporation station	1	126	126
Fisher-Porter gage	1	127	127
Hygrothermograph	1	128	128
Minimum thermometer	1	129	129
Maximum thermometer	1	130	130
Nonrecording river gage	1	131	131
Nonstandard rain gage	1	132	132
Nonstandard shelter	1	133	133
Recording river gage	1	134	134
Recording rain gage	1	135	135
Snow density gage	1	136	136
Storage gage	1	137	137

:
:

Standard rain gage	1	138	138
Standard shelter	1	139	139
Thermograph	1	140	140
Digital thermometer	1	141	141
Tipping bucket gage	1	142	142
Other than class "A" evaporation station	1	143	143
Max/min temperature system	1	144	144

Observation time	Alphanumeric	4	146	149
Precip Height	Alphanumeric	2	151	152
Temp Height	Alphanumeric	2	154	155

The next 16 numeric variables represent the following forms of publications. If the data from a particular station appeared in a publication, the variable will have a value of 1; if not, the variable will have a value of 0. The variables and their corresponding forms of publications are as follows:

Bulletin W	1	157	157
Combined Bulletin	1	158	158
Climatological Data	1	159	159
Daily River Stages	1	160	160
Hydrological Bulletin	1	161	161
Published as hourly precip data	1	162	162
Snow Bulletin	1	163	163
Not published	1	164	164
Report to the chief of the U.S. Weather Bureau	1	165	165
Monthly weather review	1	166	166
Published in state publications	1	167	167
Local Climatological Data	1	168	168
Bulletin Q, 1870-1903	1	169	169
Storage Gage Precip Data, Western U.S.	1	170	170
Weekly Weather Review	1	171	171
U.S. Meteorological Handbook	1	172	172

Observers name	Alphanumeric	40	174	213
Number	Numeric	2	215	216

where

X is the dummy variable used in the SAS program to differentiate header records from data records;

Station ID is composed of the two-digit state code followed by the four-digit Cooperative Network Index;

State is the two letter state abbreviation;

Division is the station division number;

Station name is the most current station name;

County in which the station is located;

Cross Reference is a station check, representing the cooperative network index
:

of the station or the county name that the current station moved to or from;

Station ID 2 is composed of the two-digit state code followed by the four-digit Cooperative Network Index;

Month is the month when the data record started (missing values are represented by 99);

Day is the day when the date record started (missing values are represented by 99);

Year is the year when the data record started;

Month end is the month the data record ended (missing values are represented by 99);

Date end is the day the data record ended (missing values are represented by 99);

Year end is the year the data record ended (missing values are represented by 9999);

Latitude is the current station latitude expressed in degrees and minutes north;

Longitude is the current station longitude expressed in degrees and minutes west;

Distance is the distance, in tenths of miles, from the previous station location (e.g., 015 = 1.5 miles), with unknown distances represented by 999;

Direction is the direction (16 point) of a station move from the previous location. The location of the temperature instrument defines the official station location. Values may be blank, character, or numeric. Unknown direction is represented by 999. Some examples of **Distance** and **Direction** combinations are:

999 999 = first record of new station or distance and direction unknown;
015 NW = station moved 1.5 miles NW from previous location;
000 000 = no change in station (or instrument) location;
000 ESE = moved <0.1 mile, direction unknown;
902 ESE = temperature instrument moved 0.2 miles ESE and precipitation instrument either did not move or was moved to a location different than that of the temperature instrument;
800 000 = precipitation instrument moved <0.1 mile, but the temperature instrument did not move; and
999 NW = distance unknown, direction NW;

Elevation is the ground elevation at the station, expressed in whole feet above or below mean sea level;

Distance from post office is the distance, in tenths of miles, from the nearest post office (e.g. 015 = 1.5 miles), with unknown distances represented by 999;

:

Direction from post office is the direction on a 16 point compass from the nearest post office. Values may be either blank, character, or numeric. Unknown directions are represented by 999. Some examples of **Distance from post office** and **Direction from post office** are:

999 999 = distance and direction unknown;
015 NW = 1.5 miles NW of post office;
000 NW = <0.1 mile from post office;
000 999 = <0.1 mile from post office, direction unknown; and
000 000 = at the post office.

Name is the full station name;

Qualifier is a description that is added to the proper name of the station (e.g., Charleston 2WNW);

Observation time are the times (2 characters each) for precipitation and temperature, respectively, if both times are known. Values may be either numeric (rounded to eh nearest whole hour), character, or alphanumeric. Codes which relate to one or both of the times may also be present. Possible values and their meanings include the following:

0719 = precipitation amount read at 0700 LST (local standard time), temperatures read at 1900 LST;
SRSS = precipitation amount read at sunrise, temperatures read at sunset;

SS99 = precipitation amount read at sunset, time of temperature observations either unknown or no temperature data was available for that period of the record;
06HR = station observed 6 hours per day (not to be confused with a 6-hourly synoptic observing schedule). How these observations were used to produce daily precipitation amount and maximum/minimum temperatures is unclear;
9079 = ambiguous form; station records only gave one observation time (0700 LST), but it is unknown if this time applies to both precipitation and temperature;
TRID = Tri-daily temperature observations (TAVG = [7AM + 2PM + (2 x 9PM)]/4, but time of observation for precipitation amount is unknown; and
RSSS = Precipitation amounts read on a rotation schedule (SR during crop season, i.e., April/May-October/November, but SS otherwise) temperatures read at sunset;

Precip height is the height of the precipitation instrument above ground level. Values may be numeric or character, with numeric values expressed to the nearest whole foot;

Temp height is the height of the temperature instrument above ground level. Values may be numeric or character, with numeric values expressed to eh nearest whole foot. Potential values for both **Precip height** and **Temp height** Include the following:

01-97 = actual height;
98 = ≥ 98 feet;
99 = missing; and

:
:

RF = roof, actual height above ground level unknown.

Observers name is the observer's name (may include more than one name per record);

Number is the number of observers participating during the time of record for an agency.

HCN/D Data Files

The 48 HCN/D data files (one for each state of the contiguous United States) contain daily maximum and minimum temperature (°F), precipitation amounts (hundredths of inches) snowfall amounts (tenths of inches), snow depths (whole inches) and data flags from the 1062 HCN/D stations. The files are sorted by six-digit station number (the two-digit state code followed by the four-digit Cooperative Network Index), year, and month, with one record per month containing station number, data type, data units, year, month, number of days in the month, and 31 daily data values with their respective flags.

Each data record contains a month's worth of daily snow depth values. In general, snowfall occurs during the months between October and April; however, various sites may receive snowfall as early as September and as late as July. As such, a record is always provided for each of the months spanning October through April (even if all daily data are missing). Therefore, each full year of a site's period of record will have a minimum of seven months (January through April of one 'season' and October through December of another 'season'). However, when snowfall occurred in months beyond or before the "standard" season (e.g., after April or before October), records were included for each intervening month as needed to extend the snow depth "season". The "seasons" are defined as the two 6-month periods January through June and July through December.

Stated in tabular form, the contents of an **HCN/D data file** include the following.

Variable	Variable type	Variable width	Starting column	Ending column
Station ID	Character	6	2	7
Data Type	Character	4	9	12
Year	Numeric	4	14	17
Month	Numeric	2	18	19
Days	Numeric	2	21	22
Source Flags(1)	Alphanumeric	1	24	24
Value(1)	Numeric	4	25	28
Data Measurement Flags(1)	Alphanumeric	1	29	29
Data Quality Flags(1)	Alphanumeric	1	30	30
Source Flag(2-31)	Alphanumeric	1	*	*
Value(2-31)	Numeric	4	*	*
Data Measurement Flags(2-31)	Alphanumeric	1	*	*

:

Data Quality Flags(2-31)	Alphanumeric	1	*	*

*May be obtained using: COL(N) = COL(1) + (N*8) – 8, where COL(N) is the starting/ending column for Source Flag(N), Value(N), Data Measurement Flag(N), or Data Quality Flag(N); COL(1) is the starting/ending column for Source Flag(1), Value(1), Data Measurement Flag(1), or Data Quality Flag(1); and N is the day of the month (2-31).

where

Station ID is the station identification number, composed of the two-digit state code followed by the four-digit Cooperative Network Index (defined as character to preserve leading zeros upon output);

Data Type is the type of data (**TMAX** = maximum temperature, **TMIN** = minimum temperature, **PRCP** = precipitation amount, **SNOW** = snowfall amount, and **SNWD** = snow depth). Some stations do not always have records for all three data types in a given month.

Year is the year of the data;

Month is the month of the data;

Days is the number of days in the month;

Source Flags(1) is the source flags for the daily data values;

Value(1-31) are daily data values, with temperatures in whole degrees Fahrenheit and precipitation amounts in hundredths of inches, snowfall amount in tenths of inches, and snow depth in whole inches;

Data Measurement Flags are the **DMF** for the daily data values; and

Data Quality Flags are the **DQF** for the daily data values.

Flag codes for the HCN/D data

Source Flag is a code indicating the source of the daily data value. The codes and their meanings are as follows:

0 = NCDC Tape Deck 3200, *Summary of the Day* Element Digital File;
3 = Manuscript-Original Records, NCDC;
4 = *Climatological Data* (CD) (monthly NCDC publication);
5 = *Climate Record Book*; as described within; *History of Climatogical Records Books*, U.S. Department of Commerce, Weather Bureau, U.S. Government Printing Office (1960);
Blank = manually estimated (see **DQF** flag) or missing data value.

Data Measurement Flag is the flag that describes how the daily value was measured. The codes and their meanings are as follows:

A = amount of accumulated precipitation since last measurement;

:
:

B = amount of accumulated precipitation since last measurement (includes estimated values);
E = manual or automated estimated value (see **DQF** flag for the particular estimation procedure);
J = value has been manually validated;
I = value determined by spatial interpolation using data from surrounding HCN stations;
S = data value is included in a subsequent value;
T = Trace of precipitation, snowfall or snow depth (data value should equal 0 for a trace);
⩽ = Expert System edited value; not validated;
⩾ = Expert System approved edited value; and
Blank = valid original data (no flag needed) or missing data value.

*Please note: other values occasionally appear as data measurement flags for which documentation is not currently available, e.g.,"C" and "s".

Data Quality Flag. In January 1982, NCDC instituted a greatly enhanced computer algorithm for automated validation of digital data archives. The system checks the internal consistency of a station's data and compares each station's observations to prescribed climatological limits and observations from surrounding stations. Numeric **DQF** codes apply only to NCDC's digital data, i.e., where the source flag is equal to "0" for a particular value. Alphabetic codes describe the particular manual or automated NCDC procedure employed to correct or estimated a data value. The codes and their meanings are as follows:

0 = valid data;
1 = valid data (Pre-1982 quality control methods were employed, with only a gross check of the magnitude of the value.);
3 = invalid data-no edited data value available;
4 = validity unknown-automated quality control procedures have not been applied;
A = substituted temperature from time of observation for **TMAX** or **TMIN**;
B = time-shifted value;
F = adjusted **TMAX** or **TMIN** by a multiple of ± 10°;
L = switched **TMAX** and **TMIN**;
M = switched temperature from time of observation with **TMAX** or **TMIN**;
N = substituted the mean of values taken from the three nearest cooperative weather stations;
O = snow and precipitation columns were switched in a station's report;
R = precipitation amount was not reported, "0" had been inserted;
S = manually edited value (derived using one of the procedures described by data quality flags A-R);
T = data value failed internal consistency check; and
Blank = valid data value with source flag other then "0" or missing data value.

Measured Hours of Sunshine File

The measured hours of sunshine file contains monthly and annual hours of sunshine for each year from each of the 240 sunshine stations. The data are sorted by WBAN (Weather Bureau Army Navy) station number, with each record containing the WBAN station number, information on any previous WBAN station
:

number, state name and station name, monthly values of hours of sunshine, and an annual value of hours of sunshine. Missing sunshine amounts are set to -99.

Variable	Variable type	Variable width	Starting column	Ending column
WBAN	Numeric	5	2	6
Actual WBAN	Numeric	5	8	12
Month	Numeric	2	14	15
State	Character	18	18	35
Year	Numeric	4	38	41
Jan	Numeric	3	44	46
Feb	Numeric	3	49	51
Mar	Numeric	3	54	56
Apr	Numeric	3	59	61
May	Numeric	3	64	66
Jun	Numeric	3	69	71
Jul	Numeric	3	74	76
Aug	Numeric	3	79	81
Sep	Numeric	3	84	86
Oct	Numeric	3	89	91
Nov	Numeric	3	94	96
Dec	Numeric	3	99	101
Total	Numeric	4	105	108

where

WBAN is the 1987 WBAN station number of the number during the final year of a stations record;

Actual WBAN is the actual **WBAN** number that was assigned during that year is the record (set to 0 after the first year in which the latest **WBAN** number was assigned, set to 99999 for years in which the **WBAN** number was not known or not assigned);

Month is the month when a new **WBAN** number went into effect (set to 0 for years when no change took place);

State is the state abbreviation and station name;

Year is the year of the data;

Jan-Dec are the monthly measured hours of sunshine values (nearest whole hour); and

Total in the total hours of sunshine recorded in that year (nearest whole hour).

Maximum Possible Hours of Sunshine File

The maximum possible hours of sunshine file contains monthly and annual values for the maximum hours of sunshine that could be received at each station. The file is sorted by WBAN station number, with each record containing WBAN

:

station number, state and station name, monthly and annual maximum possible sunshine amounts (hours) for non-leap years, and an adjustment factor (hours) to be added to the February and annual values in leap years.

Variable	Variable type	Variable width	Starting column	Ending column
WBAN	Numeric	5	2	6
State	Character	18	8	25
Jan	Numeric	3	27	29
Feb	Numeric	3	31	33
Mar	Numeric	3	35	37
Apr	Numeric	3	39	41
May	Numeric	3	43	45
Jun	Numeric	3	47	49
Jul	Numeric	3	51	53
Aug	Numeric	3	55	57
Sep	Numeric	3	59	61
Oct	Numeric	3	63	65
Nov	Numeric	3	67	69
Dec	Numeric	3	71	73
Total	Numeric	6	75	80
Adjust	Numeric	4	82	85

where

WBAN is the WBAN station number;
State in the state abbreviation and station name;

Jan-Dec are the monthly values of the maximum hours of sunshine possible at that station (nearest whole hour);

Total are the monthly are the maximum hours of sunshine possible at that station in a non-leap year (given to the nearest tenth of an hour, e.g., 4447.3); and

Adjust is the number of hours to add to **Feb** and **Total** for leap years (also given to the nearest tenth of an hour, e.g., 11.4).

Percentage of Possible Sunshine File

The percentage of possible sunshine file contains monthly annual values of percentage of possible sunshine for each year from each of the 240 sunshine stations. The file is sorted by WBAN station, with each record containing WBAN station number, state and station name, monthly sunshine percentages (missing values are set to -9999) with each month's four respective data flags, and as annual sunshine percentage (the mean of the monthly values, if none are set to missing; otherwise set to the missing indicator -9999).

Variable	Variable type	Variable width	Starting column	Ending column
WBAN	Numeric	5	2	6
State	Character	18	8	25
Year	Numeric	4	27	30
Jan	Numeric	5	31	35
Jan Flag1	Alphanumeric	1	36	36
Jan Flag2	Alphanumeric	1	37	37
Jan Flag3	Alphanumeric	1	38	38
Jan Flag4	Alphanumeric	1	39	39
Feb	Numeric	5	40	44
Feb Flag1	Alphanumeric	1	45	45
Feb Flag2	Alphanumeric	1	46	46
Feb Flag3	Alphanumeric	1	47	47
Feb Flag4	Alphanumeric	1	48	48
Mar	Numeric	5	49	53
Mar Flag1	Alphanumeric	1	54	54
Mar Flag2	Alphanumeric	1	55	55
Mar Flag3	Alphanumeric	1	56	56
Mar Flag4	Alphanumeric	1	57	57
Apr	Numeric	5	58	62
Apr flag1	Alphanumeric	1	63	63
Apr Flag2	Alphanumeric	1	64	64
Apr Flag3	Alphanumeric	1	65	65
Apr Flag4	Alphanumeric	1	66	66
May	Numeric	5	67	71
May Flag1	Alphanumeric	1	72	72
May Flag2	Alphanumeric	1	73	73
May Flag3	Alphanumeric	1	74	74
May Flag4	Alphanumeric	1	75	75
Jun	Numeric	5	76	80
Jun Flag1	Alphanumeric	1	81	81
Jun Flag2	Alphanumeric	1	82	82
Jun Flag3	Alphanumeric	1	83	83
Jun Flag4	Alphanumeric	1	84	84
Jul	Numeric	5	85	89
Jul Flag1	Alphanumeric	1	90	90
Jul Flag2	Alphanumeric	1	91	91
Jul Flag3	Alphanumeric	1	92	92
Jul Flag4	Alphanumeric	1	93	93
Aug	Numeric	5	94	98
Aug Flag1	Alphanumeric	1	99	99
Aug Flag2	Alphanumeric	1	100	100
Aug Flag3	Alphanumeric	1	101	101
Aug Flag4	Alphanumeric	1	102	102
Sep	Numeric	5	103	107
Sep Flag1	Alphanumeric	1	108	108
Sep Flag2	Alphanumeric	1	109	109
Sep Flag3	Alphanumeric	1	110	110
Sep Flag4	Alphanumeric	1	111	111
Oct	Numeric	5	112	116
Oct Flag1	Alphanumeric	1	117	117

:

Oct Flag2	Alphanumeric	1	118	118
Oct Flag3	Alphanumeric	1	119	119
Oct Flag4	Alphanumeric	1	120	120
Nov	Numeric	5	121	125
Nov Flag1	Alphanumeric	1	126	126
Nov Flag2	Alphanumeric	1	127	127
Nov Flag3	Alphanumeric	1	128	128
Nov Flag4	Alphanumeric	1	129	129
Dec	Numeric	5	130	134
Dec Flag1	Alphanumeric	1	135	135
Dec Flag2	Alphanumeric	1	136	136
Dec Flag3	Alphanumeric	1	137	137
Dec Flag4	Alphanumeric	1	138	138
Mean	Numeric	5	140	144

where

WBAN is the WBAN station number;

State is the state abbreviation and station name;

Year is the year of the data;

Jan-Dec are the monthly percentages of possible sunshine (nearest whole percent), with missing values set to -9999; and

Mean is the mean of the monthly sunshine percentages, if all 12 are available; otherwise set to the missing indicator -9999.

Flag codes for the data

The use of flags in the percentage of possible sunshine file was generally modeled after the U.S. Historical Climatology Network (HCN) format, example of which may be found in Karl et al. (1990). This meant that each monthly data value had four flag positions. For consistency, these flag positions are retained in the percentage of possible sunshine file, but their use has been simplified as follows.

(Jan-Dec)Flag1 is a general data type. The codes are as follows:

Z = value has been estimated by resistant regression on cloud data; and
Blank = value based on observations (see Flag2 for details).

(Jan-Dec)Flag2 is the data source code. The codes are as follows:
3 = Manuscript-Original Records, NCDC;
7 = LCD-***Local Climatological Data***, published monthly by the National Climate Data Center (NCDC), Asheville, North Carolina
T = NCDC Tape Deck 9788;
I = NCDC Tape Deck 9788-values is an estimate because of incomplete data for the month [i.e., at least one missing day (actual number not available)];

:

C = NCDC Tape Deck 9788-value from deck has been edited after comparison with the monthly cloud amount from the station; and
Z = value had been estimated by resistant regression on cloud amount.

(Jan-Dec)Flag3 has the same meaning as **Flag1**.

(Jan-Dec)Flag4 has the same meaning as **Flag1**.

Cloud Amount File

The cloud amount file contains monthly and annual cloud amount (percentage of sky cover) for each year from each of the 197 stations. The file is sorted by WABN station number, with each record containing WBAN station number, state and station name, monthly cloud amounts (missing values are set to -9999) with each month's 4 respective data flags, and as annual cloud amount (the mean of the monthly values if none are set to missing; otherwise set to the missing indicator -9999).

Variable	Variable type	Variable width	Starting column	Ending column
WBAN	Numeric	5	2	6
State	Character	18	8	25
Year	Numeric	4	27	30
Jan	Numeric	5	31	35
Jan Flag1	Alphanumeric	1	36	36
Jan Flag2	Alphanumeric	1	37	37
Jan Flag3	Alphanumeric	1	38	38
Jan Flag4	Alphanumeric	1	39	39
Feb	Numeric	5	40	44
Feb Flag1	Alphanumeric	1	45	45
Feb Flag2	Alphanumeric	1	46	46
Feb Flag3	Alphanumeric	1	47	47
Feb Flag4	Alphanumeric	1	48	48
Mar	Numeric	5	49	53
Mar Flag1	Alphanumeric	1	54	54
Mar Flag2	Alphanumeric	1	55	55
Mar Flag3	Alphanumeric	1	56	56
Mar Flag4	Alphanumeric	1	57	57
Apr	Numeric	5	58	62
Apr flag1	Alphanumeric	1	63	63
Apr Flag2	Alphanumeric	1	64	64
Apr Flag3	Alphanumeric	1	65	65
Apr Flag4	Alphanumeric	1	66	66
May	Numeric	5	67	71
May Flag1	Alphanumeric	1	72	72
May Flag2	Alphanumeric	1	73	73
May Flag3	Alphanumeric	1	74	74
May Flag4	Alphanumeric	1	75	75
Jun	Numeric	5	76	80
Jun Flag1	Alphanumeric	1	81	81
Jun Flag2	Alphanumeric	1	82	82

:
:

Jun Flag3	Alphanumeric	1	83	83
Jun Flag4	Alphanumeric	1	84	84
Jul	Numeric	5	85	89
Jul Flag1	Alphanumeric	1	90	90
Jul Flag2	Alphanumeric	1	91	91
Jul Flag3	Alphanumeric	1	92	92
Jul Flag4	Alphanumeric	1	93	93
Aug	Numeric	5	94	98
Aug Flag1	Alphanumeric	1	99	99
Aug Flag2	Alphanumeric	1	100	100
Aug Flag3	Alphanumeric	1	101	101
Aug Flag4	Alphanumeric	1	102	102
Sep	Numeric	5	103	107
Sep Flag1	Alphanumeric	1	108	108
Sep Flag2	Alphanumeric	1	109	109
Sep Flag3	Alphanumeric	1	110	110
Sep Flag4	Alphanumeric	1	111	111
Oct	Numeric	5	112	116
Oct Flag1	Alphanumeric	1	117	117
Oct Flag2	Alphanumeric	1	118	118
Oct Flag3	Alphanumeric	1	119	119
Oct Flag4	Alphanumeric	1	120	120
Nov	Numeric	5	121	125
Nov Flag1	Alphanumeric	1	126	126
Nov Flag2	Alphanumeric	1	127	127
Nov Flag3	Alphanumeric	1	128	128
Nov Flag4	Alphanumeric	1	129	129
Dec	Numeric	5	130	134
Dec Flag1	Alphanumeric	1	135	135
Dec Flag2	Alphanumeric	1	136	136
Dec Flag3	Alphanumeric	1	137	137
Dec Flag4	Alphanumeric	1	138	138
Mean	Numeric	5	140	144

where

WBAN is the WBAN station number;

State is the state abbreviation and station name;

Year is the year of the data;

Jan-Dec are the monthly cloud amounts (nearest whole percent of sky cover); and

Mean is the mean of the monthly cloud amounts, if all 12 are present; otherwise set to the missing indicator -9999.

Flag codes for the data

The use of flags in the cloud amount file was also generally modeled after the U.S. HCN format (Karl et al. 1990). The four flag positions normally associated with each monthly value are retained in the file, but their use has been customized as follows.

(Jan-Dec)Flag1 is a dual purpose code pertaining to either (1) the number the

:

daily values not available in computing the monthly mean cloud amount or (2) how an estimate of the monthly mean cloud amount has been produced. The codes and their meanings are as follows:

A,B,C,…I corresponds to 1,2,3…9 days missing;
Blank = no missing days;
X = Value had been estimated from manuscript entries (see Flag2); and
Z = value has been estimated by resistant regression on percentage of possible sunshine

(Jan-Dec)Flag2 is the data source code. The codes and their meanings are as follows:

1 = NCDC Tape Deck 3210, Summary of the Day, First Order;
3 = Manuscript-Original National Climatic Data Center Records;
5 = Climate Record Book-for a description, see ***History of Climatological Record Books***, U.S. Department of Commerce, Weather Bureau, U.S.G.P.O., 1960;
7 = LCD-***Local Climatological Data***, published monthly by NCDC;
M = ***Monthly Weather Review***, U.S. Weather Bureau, U.S.G.P.O., 1872-1966
R = ***Report of the Chief of the Weather Bureau*** U.S. Weather Bureau, U.S.G.P.O., 1891-1934; ***United Sated Meteorological Yearbook***, U.S.G.P.O., 1935-1949; or ***Climatological Data, National Summary***, U.S. Weather Bureau, Asheville, North Carolina, 1950-1980; and
Z = value has been estimated by resistant regression on percentage of possible sunshine.

(Jan-Dec)Flag3 is the location code. The codes and their meanings are as follows:

0 = primary station location is current;
U = previous station number unknown;
1 = prior city or airport location;
2 = second city or airport location;
3 = third airport location; and
Z = value has been estimated by resistant regression on percentage of possible sunshine.

(Jan-Dec)Flag4 is an additional source qualifier. The codes and their meanings are as follows:

C = computed by technician from data available in the nondigital source specified by **Flag2;**
Blank = data are directly from the source specified by **Flag2**; and
Z = value has been estimated by resistant regression on percent of possible sunshine.

3. Start Date: 18719999

4. Stop Date: Ongoing

5. Coverage: North America

a. Southernmost Latitude: 25N
b. Northernmost Latitude: 50N
c. Westernmost Longitude: 125W
d. Easternmost Longitude: 65W

6. How to Order Data:

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
E-mail: **NCDC.Orders@noaa.gov**

7. Archiving Data Center:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

8. Technical Contact:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

9. Known Uncorrected Problems: None.

10. Quality Statement: An important part of the numeric data packaging process at CDIAC is the quality assurance (QA) of data before distribution. Data received at CDIAC are rarely in perfect condition for immediate distribution, regardless of their source. To guarantee data of the highest quality, CDAIC conducts extensive QA reviews. Reviews involve examining the data for completeness, reasonableness, and accuracy. Although they have common objectives, these reviews are tailored to each data set, often requiring extensive programming efforts. Although time-consuming, the QA process is an important component is the value-added concept of ensuring accurate, usable data for researchers.

NCDC conducted extensive manual and automated QA assessments of the HCN/D data. Although the data sent by NCDC was in excellent condition, CDIAC still conducted QA checks on the data and found some minor discrepancies. The following summarizes the QA work performed by NCDC and CDIAC, respectively.

NCDC QA Check and Adjustments

1. Monthly mean values of maximum and minimum temperature, computer from the HCN/D data, were compared to their respective unadjusted monthly means from

the HCN. All conflicts were investigated and resolved, with verification based on manuscript or published sources.*

2. Checks were performed to ensure that no monthly mean values of maximum and minimum temperature calculated from a station's daily data were above (below) the monthly state extremes of maximum (minimum) temperature.

3. Any daily precipitation total exceeding 5 in. was verified against manuscript of published sources.

4. Checks were implemented to ensure that maximum temperatures were never less than minimum temperatures on the day of occurrence, the preceding day, and the following day. Conversely, checks were performed to ensure that minimum temperatures were never greater than maximum temperatures on the day of occurrence, the preceding day, and the following day.

5. Temperature data from stations that took readings during the morning over some period have been checked for any date shifting resulting from observers assigning readings to the calendar day of occurrence (the previous day in case of maximum temperature) rather than the observation day. Such readings were switched back to the day of observance as part of the manual QA checks on the HCN/D data. Of the 14 stations in the HCN/D that now take only morning readings, the records of 10 stations were found to include instances in which the maximum temperature was entered on the calendar day of occurrence. Similar "shifting" occurred at 12 other station during the brief periods for which these sites took morning readings as well. These identifiable periods of record are detailed in Table 3.

CDIAC QA Checks and Modifications

1. Because each record in an HCN/D file contains 31 daily elements (to allow for 31 days in a month), elements pertaining to nonexistent dates were checked for missing data indicators with blank flag spaces (the prescribed convention). Records for which this was not the case were modified accordingly. (Records occasionally contained artifacts such as a monthly mean maximum and minimum temperature occupying element 31 for months with less than 31 days.)

2. Several types of data source, measurement, and quality flags were found in the data that were not included in the documentation provided by NCDC. A list of these flags was submitted to NCDC. Several of these proved to be meaningless, resulting from data entry errors. Others were real data flags whose meanings were then related to CDIAX for documentation in this package.

3. The logical record of length of the HCN/D files was shortened from 402 to 270 characters. This was accomplished by deleting unnecessary information and compressing the width of each daily data field.

4. All data records were checked to ensure that the number of days in the month (specified in each record) was correct for the year and month of each record. Eighteen February records form 18 different stations required correction; some specifying 29 days in non-leap years, others specifying only 28 days in leap years.

Table 3

HCN/D stations requiring calendar day shifting of maximum temperature observations for portions of their periods of record.

State Code	Station Number	State	Station Name	Period of calendar day shifting[1]	Period Length[2] (years/months)
02	0080	AZ	Ajo	03/01/21-12/31/23	2.10
				01/01/26-02/28/26	0.2
				01/01/35-12/31/41	6.2
02	3160	AZ	Fort Valley	01/01/37-12/31/40	4.0
02	5467	AZ	Mesa Exp. Farm	01/01/34-12/31/41	11.0
12	9253	IN	Washington	01/01/03-08/31/10	7.8
16	2151	LA	Covington 4 NNW	08/01/03-06/30/09	5.11
				01/01/14-08/31/18	4.8
24	7382	MT	Savage	09/01/09-09/30/11	2.1
25	1145	NE	Bridgeport	04/01/42-09/30/42	0.6
32	2188	ND	Dickenson Exp. Station	06/01/16-08/14/18	2.3
				04/01/19-06/30/48	29.3
32	5660	ND	Mayville	11/01/06-02/28/07	0.4
33	9312	OH	Wooster Exp. Station	01/10/38-12/31/41	4.0
34	4235	OK	Holdenville	09/01/03-11/30/12	9.3
				04/01/13-08/31/18	5.5
31	6638	OK	Okemah	04/01/14-11/30/18	4.8
36	6689	PA	Palmerton	05/01/17-06/30/17	0.2
				03/01/18-04/30/18	0.2
41	0120	TX	Albany	07/01/17-12/31/46	29.6
41	1048	TX	Brenham	06/01/03-10/31/18	15.5
				04/01/22-07/31/47	25.4
41	2019	TX	Corsicana	06/01/03-10/31/18	15.5
				05/01/19-10/31/20	0.6
				04/01/20-10/31/20	0.7
				04/01/21-06/30/47	26.3
41	5018	TX	Lampasas	06/01/03-12/31/07	4.7
				02/01/08-03/31/08	0.2
				05/01/08-10/17/18	10.6
				04/01/19-11/30/19	0.8
				06/01/21-09/30/21	0.4
				04/01/22-06/30/47	25.3

41	5429	TX	Luling	06/01/03-08/31/18	15.3
				05/01/21-09/30/21	0.5
				04/01/22-07/31/47	25.4
41	5869	TX	Mexia	09/01/04-08/31/18	14.0
				04/01/21-04/31/21	0.1
				04/01/22-06/30/47	25.3
41	9532	TX	Weatherford	06/01/03-09/30/18	15.4
				10/01/19-10/31/19	0.1
				01/01/23-12/31/23	1.0
				04/01/24-07/31/47	23.4
46	3353	WV	Gary	02/01/20-12/31/25	5.11

[1]Beginning and ending dates of the period in month/day/year format.
[2]Total length of period in years and months, e.g., 5.11 indicates 5 years 11 months. Periods involving a fraction of a month have their lengths rounded upward.

11. Essential Companion Datasets: None.

12. References:

Baker, D.G. 1975. Effect of observation time on mean temperature estimation. *J. Appl. Meteor.* 14:471-76.

Guttman, N.B.,and M.S. Plantico. 1987. Climatic temperature normals. *J. Clim. Appl. Meteor.* 26:1428-35.

Jones, P.D., S.C.B. Raper, R.S. Bradley, H.F. Diaz, P.M. Kelly, and T.M.L. Wigley. Northern Hemisphere surface air temperature variations 1851-1984. *J. Clim. Appl. Meteor.* 26:161-79.

Karl, T.R., G. Kukla, and J. Gavin. 1984. Decreasing diurnal temperature range in the United States and Canada from 1941 through 1980. *J. Clim. Appl. Meteor.* 23:1489-1504.

Karl, T.R., G. Kukla, and J. Gavin. 1986a. Relationship between decreased temperature range and precipitation trends in the United States and Canada, 1941-80. *J. Clim. Appl. Meteor.* 25:1878-86.

Karl, T.R., and C.N. Williams, Jr., P.J. Young, and W.M. Wendland. 1986b. A model to estimate the time of observation bias associated with monthly mean maximum, minimum, and mean temperatures for the United States. *J. Clim. Appl. Meteor.* 25:145-60.

Karl, T.R., and C.N. Williams, Jr. 1987. An approach to adjusting climatological time series for discontinuous inhomogeneities. *J. Clim. Appl. Meteor.* 26:1744-63.

Karl, T.R., H.F. Diaz, and G. Kukla. 1988. Urbanization: Its detection and effect on the United States climate record. *J. Clim*. 1:1099-1123.

Karl, T.R., C.N. Williams, Jr., and F.T. Quinlan. 1990 United States Historical Climatology Network (HCN) serial temperature and precipitation data. ORNL/CDIAC-30, NDP-019/R1. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Mitchell, J.M., Jr. 1958. Effects of changing observation time on mean temperature. *Bull. Amer. Meteor. Soc*. 39:83-89.

National Aeronautics and Space Administration. 1991. NASA SAFISY-GEDEX Atmospheric Temperature Workshop Report, Columbia, Maryland, July 9-11, 1991 (in preparation).

Quayle, F.T., T.R. Karl, and C.N. Williams, Jr. 1987. United States Historical Climatology Network (HCN) serial temperature and precipitation data. NDP-019. Carbon Dioxide Information Analysis Center. Oak Ridge National Laboratory, Oak Ridge, Tenn.

Schaal, L.A. and R.F. Dale. 1977. Time of observation temperature bias and "climatic change". *J. Appl. Meteor*. 16:215-22.

Vinnikov, K. Ya., P. Ya., Groisman, and K.M. Lugina. 1990. Emperical data on contemporary global climate changes (temperature and precipitation). *J. Clim.* 3:662-67.

World Meteorlogical Organization. 1984. Technical regulations, Vol. I. WMO-NO. 49. Geneva, Switzerland.